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EXAMINER
PATHAK, SUDHANSHU C

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Application No.

09/849,742

Applicant(s)

GRAY, PAUL K.

Examiner

Sudhanshu C. Pathak

Art Unit

2634

Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _May 4th, 2001_.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
    closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-8_ is/are pending in the application.
    4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1-8_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on _May 4th, 2001_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
    a)☐ All   b)☐ Some * c)☐ None of:
    1.☐ Certified copies of the priority documents have been received.
    2.☐ Certified copies of the priority documents have been received in Application No. _____.
    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
       application from the International Bureau (PCT Rule 17.2(a)).
    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
   Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
   Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-to-8 are pending in the application.

Drawings

2. Figures 1A-C should be designated by a legend such as "Prior Art" because only

that which is known is illustrated.

Corrective Action is required.

Specification

3. Content of Specification

(a)   <u>Title of the Invention</u>: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.

(b)   <u>Cross-References to Related Applications</u>: See 37 CFR 1.78 and MPEP § 201.11.

(c)   <u>Statement Regarding Federally Sponsored Research and Development</u>: See MPEP § 310.

(d)   <u>Incorporation-By-Reference Of Material Submitted On a Compact Disc:</u> The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e) and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

Or alternatively, <u>Reference to a "Microfiche Appendix"</u>: See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.

(e)   <u>Background of the Invention</u>: See MPEP § 608.01(c). The specification should set forth the Background of the Invention in two parts:

(1)   Field of the Invention: A statement of the field of art to which the invention pertains. This statement may include a paraphrasing of the applicable U.S. patent classification definitions of the subject matter of the claimed invention. This item may also be titled "Technical Field."

(2)   Description of the Related Art including information disclosed under 37 CFR 1.97 and 37 CFR 1.98: A description of the related art known to the applicant and including, if applicable, references to specific related art and problems involved in the prior art which are solved by the applicant's invention. This item may also be titled "Background Art."

(f)   Brief Summary of the Invention: See MPEP § 608.01(d). A brief summary or general statement of the invention as set forth in 37 CFR 1.73. The summary is separate and distinct from the abstract and is directed toward the invention rather than the disclosure as a whole. The summary may point out the advantages of the invention or how it solves problems previously existent in the prior art (and preferably indicated in the Background of the Invention). In chemical cases it should point out in general terms the utility of the invention. If possible, the nature and gist of the invention or the inventive concept should be set forth. Objects of the invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.

(g)   Brief Description of the Several Views of the Drawing(s): See MPEP § 608.01(f). A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.

(h)   Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.

(i)   <u>Claim or Claims</u>: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. There may be plural indentations to further segregate subcombinations or related steps. See 37 CFR 1.75 and MPEP § 608.01(i)-(p).

(j)   <u>Abstract of the Disclosure</u>: See MPEP § 608.01(f). A brief narrative of the disclosure as a whole in a single paragraph of 150 words or less commencing on a separate sheet following the claims. In an international application which has entered the national stage (37 CFR 1.491(b)), the applicant need not submit an abstract commencing on a separate sheet if an abstract was published with the international application under PCT Article 21. The abstract that appears on the cover page of the pamphlet published by the International Bureau (IB) of the World Intellectual Property Organization (WIPO) is the abstract that will be used by the USPTO. See MPEP § 1893.03(e).

(k)   <u>Sequence Listing.</u> See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The requirement for a sequence listing applies to all sequences disclosed in a given application, whether the sequences are claimed or not. See MPEP § 2421.02.

The specification on Pages 17-34 discloses a set of claims. As has been presented above the Claims should have a separate section and should be written on a separate sheet of paper. This has been done from Pages 35-37 of the Specification and therefore, these claims have been examined. It is also recommended that the <u>applicant provide a substitute specification comprising the sections as described above.</u>

4.   The Specification on <u>Page 3, line 1 & line 19</u> refers to "Fig. 1D", the Figure 1D has not been provided in the disclosure.

Corrective Action Is required.

5.   The Specification on Page 4, line 15 & line 24 refers to an "interleaver 200(1)" an element in Figure 2, however according to Figure 2, the interleaver elements are labeled as 202(1) & 202 (2). Therefore, the interleaver element on Page 4, line 15 should be labeled as "202(1)" and the interleaver element on Page 4, line 24 should be labeled as "202(2)".

Corrective Action Is required.

6. The Specification on Page 11, lines 26, 27 & Page 12, line 6 refers to Log-MAP decoder as element of "406" in Figure 4, however according to Figure 4, the Log-MAP decoder is labeled as element "404".

Corrective Action is required.

7. The Specification on Page 14, lines 11-12 refer to a "co-pending US patent application serial no.", but does not provide the serial number in the blank space provided.

Corrective Action is required.

Claim Objections

8. Claim 2 is objected to because of the following informalities:

- <u>Claim 2, line 6</u> refers to "set of party symbols", this should actually be "set of parity symbols".

- <u>Claim 2, line 10</u> refers to "parity bits", this should actually be "parity symbols"

Appropriate correction is required.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berrou (5,446,747) in view of Park et al. (6,397,367) in further view of Hladik et al. (5,721,745).

Regarding to Claims 1-7, Berrou discloses a data transmission system for

transmitting information bits (Abstract, lines 1-5 & Column 1, lines 10-35) comprising

an encoder for generating encoded symbols by encoding said information bits using

multiple constituent encoders and interleavers (Fig. 1 & Column 1, lines 15-20 &

Column 2, lines 54-57). Berrou further discloses a method and apparatus error-

correction coding of source digital data implementing in parallel at least two

constituent encoders and al least one interleaver and the number of encoders and

interleavers can be easily increased (Column 3, lines 15-25 & Column 7, lines 45-

60). Berrou also discloses the encoders implemented in parallel may be identical or

different (Column 7, lines 60-66 & Column 9, lines 7-40). Berrou further discloses a

sample constituent encoder that can be implemented in the parallel concatenated

encoder comprising a depth value of two (Fig. 7). Berrou also discloses

implementing a corresponding decoder for decoding the received data using a series

of iterations (Abstract, lines 10-15 & Column 4, lines 48-68 & Column 5, lines 1-10 &

Fig. 3). Berrou also discloses that the depth of the decoder depends on the trade-off

between the reliability and the complexity of the implementation of the decoder

(Column 2, lines 5-30). However, Berrou does not specifically disclose the encoder

having at least three constituent encoders and at least two interleavers wherein a

first constituent encoder has a greater depth than a second constituent encoder, and

each constituent encoder generating a corresponding set of parity symbols. Berrou

also does not disclose the decoder to use at least one soft-in-soft-out decoder for

generating extrinsic data, and interleaving the extrinsic data during the portions of

the iterations based on the encoder interleavers; and a method for decoding an

encoded signal comprising generating a set of receive samples from said signal,

decoding said receive samples according to a first coding scheme of a first depth,

decoding said receive samples according to a second coding scheme of a second

depth, decoding said receive samples according to a third coding scheme of a third

depth.

Park discloses a channel coding and decoding device for a communications

system (Abstract, line 1 & Column 1, lines 14-20 & Fig. 7 & Fig. 10). Park also

discloses implementing multiple different types of encoders as constituent encoders

coupled, in combination, in series or parallel concatenated configuration (Column 1,

lines 44-65 & Fig. 2 & Fig. 4). Park discloses encoders with a depth of two and a

depth of eight (Fig.'s 2-3). Park also discloses a decoder iteratively decoding the

received data using a MAP decoding algorithm or a soft-output viterbi algorithm

(SOVA), which is a soft-in-soft-out algorithm (Column 2, lines 5-16 & Column 4, lines

40-56 & Column 8, lines 25-35 & Fig. 4). Park also discloses the decoder to use at

least one soft-in-soft-out decoder for generating extrinsic data, and interleaving the

extrinsic data during the portions of the iterations based on the encoder interleavers

(Fig. 4). Park also discloses each constituent encoder generating a set of parity

symbols from the data inputted into the constituent encoder (Column 1, lines 42-56

& Column 2, lines 64-67 & Column 3, lines 1-25), wherein the first constituent

encoder generates a first set of parity symbols (Fig. 2, element 201, y_{1k}), a first

interleaver for generating a first interleaved information bits form the information bits

(Fig. 2, element 211), a second constituent encoder generates a second set of parity

symbols from first interleaved information bits (Fig. 2, element 202, y_{2k}). Park also

discloses a method for decoding an encoded signal comprising the steps of

generating a set of receive samples from said signal (Fig. 4, elements X_k, y_{1k}, y_{2k}),

decoding said receive samples according to a first coding scheme (Fig. 4, element

401), decoding said receive samples according to a second coding scheme (Fig. 4,

element 403). Therefore, it would have been obvious to one of ordinary skill in the

art at the time of the invention that Park teaches implementing multiple different

types of encoders, each with different depths that can be implemented in parallel

concatenation and this can be implemented in the parallel concatenated encoder as

described in Berrou. Park also teaches a method of decoding and this can be

implemented in the decoder as described in Berrou thus satisfying the limitation of

the claim. Furthermore, the selection of the depth of the constituent encoders is also

a matter of design choice depending on the complexity and reliability of the

encoder/decoder, and the desired coding and the transmission channel rate. Park

also teaches implementing a soft-in-soft-out decoder for generating extrinsic data

wherein the subiterations are performed based on the depth of the corresponding

constituent encoder and the extrinsic data is interleaved, thus satisfying the

limitations of the claim. However, Berrou in view of Park does not disclose the

encoder having three constituent encoders and two interleavers and the decoder

having three decoding schemes corresponding to the three encoders.

Hladik discloses implementing a parallel concatenated convolutional coding

scheme and an associated decoder comprising soft-in-soft-out decoding algorithm

(Abstract, lines 1-6 & Fig.'s 1-2, 5). Hladik discloses a parallel concatenated coding

scheme comprising a plurality of "N" component encoders and "N-1" interleavers for

the corresponding "N" encoders and a corresponding decoder and deinterleavers

(Fig. 1 & Column 2, lines 40-67 & Fig. 2 & Column 3, lines 25-50). Therefore, it

would have been obvious to one of ordinary skill in the art at the time of the invention

that Hladik teaches implementing a parallel concatenated coding scheme comprising

a plurality of "N" component encoders and "N-1" interleavers for the corresponding

"N" encoders and a corresponding decoder and deinterleavers and any combination

of the encoder can be implemented in the encoder / decoder device as described in

Berrou in view of Park, thus satisfying the limitations of the claim. Furthermore, the

implementation of the parallel concatenated encoder follows the prototype as

disclosed in Berrou and only the no. of parallel branches varies depending on design

choice of the encoder wherein each branch includes an interleaver and a constituted

encoder receiving the interleaved information bits.

11. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Berrou

(5,446,747) in view of Park et al. (6,397,367) in further view of Hladik et al.

(5,721,745) in further view of Sindhushayana et al. (6,594,318).

Regarding to Claim 8, Berrou in view of Park in further view of Hladik discloses a

method and apparatus for encoding and decoding comprising; a parallel

concatenation encoder further comprising at least three constituent encoders and at

least two interleavers; and a corresponding decoder using at least one soft-in-soft-out decoder as described above. Hladik further discloses deinterleaving the received samples according to a first pattern and deinterleaving the received signals according to a second pattern (Fig. 2). However, Berrou in view of Park in further view of Hladik does not disclose the interleaving / deinterleaving pattern to be pseudo random.

Sindhushayana discloses a pseudo-random interleaving / deinterleaving pattern suitable for transmitting digital data (Column 1, lines 65-67 & Column 2, lines 1-16). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention that Sindhushayana teaches an pseudo-random interleaver / deinterleaver and this can be implemented in the encoder/decoder as described in Berrou in view of Park in further view of Hladik so as to provide a better performance from the turbo encoders in a jamming environment, thus satisfying the limitation of the claim.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhanshu C. Pathak whose telephone number is (571)-272-3038. The examiner can normally be reached on M-F: 9am-6pm.

- If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on (571)-272-3056

- The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

- Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sudhanshu C. Pathak

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